[The Battle of the Standard.]

ESSAYS ON THE LIVES OF REMARKABLE PAINTERS.—No. XXIV.

Lionardo da Vinci: b. 1452; d. 1519.

We approach the period when the art of painting reached its highest perfection, whether considered with reference to poetry of conception, or the mechanical means through which these conceptions were embodied in the noblest forms. Within a short period of about thirty years, *i. e.* between 1490 and 1520, the greatest painters whom the world has yet seen were living and working together. On looking back we cannot but feel that the excellence they attained was the result of the efforts and aspirations of a preceding age; and yet these men were so great in their vocation, and so individual in their greatness, that, losing sight of the linked chain of progress, they seem at first to have had no precursors, as they have since had no peers. Though living at the same time, and most of them in personal relation with each other, the direction of each mind was different—was peculiar; though exercising in some sort a reciprocal influence, their influence never interfered with the most decided originality. These wonderful artists, who would have been remarkable men in their time, though they had never touched a pencil, were Lionardo da Vinci, Michael Angelo,

Raphael, Correggio, Giorgione, Titian, in Italy; and in Germany, Albert Durer. Of these men, we may say, as of Homer and Shakspere, that they belong to no particular age or country, but to all time, and to the universe. That they flourished together within one brief and brilliant period, and that each carried out to the highest degree of perfection his own peculiar aims, was no casualty. Nor are we to seek for the causes of this surpassing excellence merely in the history of the art as such. The causes lay far deeper, and must be referred to the history of human culture. The fermenting activity of the fifteenth century found its results in the extraordinary development of human intelligence in the commencement of the sixteenth century. We hear of "the spirit of the age," but in that wonderful age three mighty spirits were stirring society to its depths:—the spirit of bold investigation into truths of all kinds, which led to the Reformation; the spirit of daring adventure, which led men in search of new worlds beyond the eastern and the western oceans; and the spirit of art, through which men soared even to the "seventh heaven of invention."

Lionardo da Vinci seems to present in his own person a *resumé* of all the characteristics of the age in which he lived. He was *the* miracle of that age of miracles. Ardent and versatile as youth; patient and persevering as age; a most profound and original thinker; the greatest mathematician, and most ingenious mechanic of his time; architect, chemist, engineer, musician, poet, painter!—we are not only astounded by the variety of his natural gifts and acquired knowledge, but by the practical direction of his amazing powers. The extracts which have been published from MSS. now existing in his own handwriting, show him to have anticipated by the force of his own intellect some of the greatest discoveries made since his time. These fragments, says Mr. Hallam,* "are, according to our common estimate of the age in which he lived, more like revelations of physical truths vouchsafed to a single mind, than the superstructure of its reasoning upon any established basis. The discoveries which made Galileo, Kepler, Castelli, and other names illustrious—the system of Copernicus—the very theories of recent geologists, are anticipated by Da Vinci within the compass of a few pages, not perhaps in the most precise language, or on the most conclusive reasoning, but so as to strike us with something like the awe of preternatural knowledge. In an age of so much dogmatism, he first laid down the grand principle of Bacon, that experiment and observation must be the guides to just theory in the investigation of nature. If any doubt could be harboured, not as to the right of Lionardo da Vinci to stand as the first name of the fifteenth century, which is beyond all doubt,† but as to his originality in so many discoveries, which probably no one man, especially in such circumstances, has ever made—it must be by an hypothesis not very untenable, that some parts of physical science had already attained a height which mere books do not record."

It seems at first sight almost incomprehensible that, thus endowed as a philosopher, mechanic, inventor, discoverer, the fame of Lionardo should now rest on the works he has left as a painter. We cannot, within these limits, attempt to explain why and how it is that as the man of science he has been naturally and necessarily left behind by the onward march of intellectual progress, while as the poet-painter he still survives as a presence and a power. We must proceed at once to give some account of him in the character in which he exists to us and for us—that of the great artist.

Lionardo was born at Vinci, near Florence, in the Lower Val d' Arno, on the borders of the territory of Pistoia. His father, Piero da Vinci, was an advocate of Florence—not rich, but in independent circumstances, and possessed of estates in land. The singular talents of his son induced Piero to give him, from an early age, the advantage of the best instructors. As a child, he distinguished himself by his proficiency in arithmetic and mathematics. Music he studied early, as a science as well as an art. He invented a species of lyre for himself, and sung his own poetical compositions to his own music—both being frequently extemporaneous. But his favourite pursuit was the art of design in all its branches; he modelled in clay or wax, or attempted to draw every object which struck his fancy. His father sent him to study under Andrea Verocchio, famous as a sculptor, chaser in metal, and painter. Andrea, who was an excellent and correct designer, but a bad and hard colourist, was soon after engaged to paint a picture of the Baptism of our Saviour. He employed Lionardo, then a youth, to execute one of the angels: this he did with so much softness and richness of colour, that it far surpassed the rest of the picture; and Verocchio from that time threw away his palette, and confined himself wholly to his works in sculpture and design; "enraged," says Vasari, "that a child should thus excel him."

The youth of Lionardo thus passed away in the pursuit of science and of art: sometimes he was deeply engaged in astronomical calculations and investigations; sometimes ardent in the study of natural history, botany, and anatomy; sometimes intent on new effects of colour, light, shadow, or expression in representing objects animate or inanimate. Versatile, yet persevering, he varied his pursuits, but he never abandoned any. He was quite a young man when he conceived and demonstrated the practicability of two magnificent projects: one was, to lift the whole of the church of San Lorenzo, by means of immense levers, some feet higher than it now stands, and thus supply the deficient elevation;* the other project was, to form the Arno into a navigable canal, as far as Pisa, which would have added greatly to the commercial advantages of Florence.†

It happened about this time that a peasant on the estate of Piero da Vinci brought him a circular piece of wood, cut horizontally from the trunk of a very large old fig-tree, which had been lately felled, and begged to have something painted on it as an ornament for his cottage. The man being an especial favourite, Piero desired his son Lionardo to gratify his request; and Lionardo, inspired by that wildness of fancy which was one of his characteristics, took the panel into his own room, and resolved to astonish his father by a most unlooked-for proof of his art. He determined to compose something which should have a similar effect to the Medusa on the shield of Perseus, and almost petrify beholders. Aided by his recent studies in natural history, he collected together from the neighbouring swamps and the river-mud all kinds of hideous reptiles, as adders, lizards, toads, serpents; insects, as moths, locusts; and other crawling and flying obscene and obnoxious things; and out of these he compounded a sort of monster or chimera, which he represented as about to issue from the shield, with eyes flashing fire, and of an aspect so fearful and abominable that it seemed to infect the very air around. When finished, he led his father into the room in which it was placed, and the terror and horror of

* 'History of the Literature of Europe.'

† When we think of Lionardo's contemporary, Columbus, we feel inclined, if not to dispute this fiat of the great historian, at least to ponder on it—and those ponderings lead us far.

* Wild as this project must have appeared, it was not perhaps impossible. In our days the Sunderland Lighthouse was lifted from its foundations, and removed to a distance of several yards.

† This project was carried into execution 200 years later.

Piero proved the success of his attempt. This production, afterwards known as the "Rotello del Fico,"* from the material on which it was painted, was sold by Piero secretly for 100 ducats, to a merchant, who carried it to Milan, and sold it to the duke for 300. To the poor peasant thus cheated of his "Rotello" Piero gave a wooden shield, on which was painted a heart transfixed by a dart; a device better suited to his taste and comprehension. In the subsequent troubles of Milan, Lionardo's picture disappeared, and was probably destroyed as an object of horror, by those who did not understand its value as a work of art.

The anomalous monster represented on the "Rotello" was wholly different from the Medusa, afterwards painted by Lionardo, and now existing in the Florence Gallery. It represents the severed head of Medusa, seen foreshortened, lying on a fragment of rock: the features are beautiful and regular; the hair already metamorphorsed into serpents—

> "which curl and flow,
> And their long tangles in each other lock,
> And with unending involutions show
> Their mailed radiance."

Those who have once seen this terrible and fascinating picture, can never forget it. The ghastly head seems to expire, and the serpents to crawl into glittering life, as we look upon it.

During this first period of his life, which was wholly passed in Florence and its neighbourhood, Lionardo painted several other pictures of a very different character, and designed some beautiful cartoons, of sacred and mythological subjects, which showed that his sense of the beautiful, the elevated, and the graceful was not less a part of his mind than that eccentricity and almost perversion of fancy which made him delight in sketching ugly, exaggerated caricatures, and representing the deformed and the terrible.

Lionardo da Vinci was now about thirty years old, in the prime of his life and talents. His taste for pleasure and expense was, however, equal to his genius and indefatigable industry; and anxious to secure a certain provision for the future, as well as a wider field for the exercise of his various talents, he accepted the invitation of Lodovico Sforza il Moro, then regent, afterwards Duke of Milan, to reside in his court, and to execute a colossal equestrian statue of his ancestor Francesco Sforza. Here begins the second period of his artistic career, which includes his sojourn at Milan, that is, from 1483 to 1499.

[To be continued.]

A Model Farm.—The farm of Whitfield, belonging to Lord Ducie, is situated on the margin of the vale of Berkeley, about thirteen miles from Bristol, on the road to Gloucester: a small part of it lies on mountain limestone and magnesian breccia; but the greater part is on a rich reddish loam, derived from strata of sandy slate and clay, belonging to the old red sandstone formation, and naturally wet. In 1839, when Mr. Morgan began, it consisted of 232 acres, which had been let for a term of twenty-one years at a rent of 200*l.* per annum. The tenant had employed a capital of 726*l.* in its cultivation—68 acres arable, 164 acres in pasture; the total value of the produce was 463*l.*: the man lived in a poor way, and, after paying his rent and expenses, had a balance of only 28*l.* a year. The first improvement consisted of clearing away useless timber; 1771 trees were cut down from the fences, which being grubbed up and levelled, added 26 acres, or about 10 per cent. to the extent of the farm. Convenient roads were made; the brook was made straight and deepened, and the greater part of the farm thoroughdrained, subsoil-ploughed, and limed; new farm-yards were laid out, surrounded with stalls for feeding oxen, and sheds for sheep and hogs, and furnished with tanks to receive the drainage from the cattle-sheds and from the yard manure. A thrashing-machine, worked by a steam-engine, was placed contiguous to the rick-yard, from which the corn is brought by a small tramroad to the thrashing-house; and rooms adapted for steaming potatoes, and for slicing roots, which form a large portion of the food given to the stock of every kind, are placed as near as possible to the stalls. The entire outlay on these permanent improvements amounted to the sum of 7829*l.* In its improved condition the farm has been enlarged to 238 acres; it is now valued for the poor-rate at 564*l.*, and the capital employed in its cultivation is 4069*l.* The value of the produce is increased more than four times. The present turnip crops average 26 tons per acre, and the wheat 45 bushels, with 2000 cubic feet of straw. Not the least important point is the increased demand for labour. Under the old system, the farm employed two men, two women, and a boy, with an addition of four during twelve weeks of harvest. It now gives employment to eleven men, five women, and four boys, being more than three times the number employed before: add to this the labour applied to draining, making tiles, roads, buildings, and machinery, which, if completed in one year, would have fully occupied 300 labourers:—we need no further evidence than that Lord Ducie has afforded by this example farm at Whitfield, to prove that a large outlay of capital in thorough-draining, and providing the buildings, apparatus, and stock required for the improved system of high farming, may, in certain cases, add even fourfold to the productive powers of the land, with more than threefold employment for agricultural labourers. We must not, indeed, conclude that the whole of England is capable of such vast improvements: they are to be made only on soils naturally rich, and rendered unproductive through bad management and want of drainage, but of these we have at present a very large amount in those extensive western and central parts of England that are situate on strata of the red sandstone formation, and of which large masses still remain in a neglected state. One general principle carried out in Lord Ducie's farm is that of self-support by abundant home production and economy of manures. During winter, the animals are fed on roots, turnips, mangold-wurzel, carrots, and potatoes, all grown upon the farm, and on straw, and hay made only from clover and artificial grass crops; not a single acre is left for permanent pasture or meadow hay; and whilst one half of the farm is under tillage for white crops, the other half is occupied with green crops, arranged in such alternate order of succession as is most effective to renovate the land by the manurance of sheep folded on the green crops, and by well-administered supplies of solid and liquid manures from stall-fed cattle.

On Lying.—In plain truth, lying is a hateful and an accursed vice. We are not men, we have no other tie upon one another but our word. If we did but perceive the horror and ill consequences of it, we should pursue it with fire and sword, and more justly than other crimes. I see that parents commonly, and with indiscretion enough, correct their children for little innocent faults, and torment them for wanton childish tricks that have neither impression nor tend to any consequence; whereas, in my opinion, lying only, and, what is of something a lower form, wilful obstinacy, are the faults which ought, on all occasions, to be combated, both in the infancy and progress of these vices, which will otherwise grow up and increase with them; and, after a tongue has once got the knack of lying, 'tis not to be imagined how impossible almost it is to reclaim it. Whence it comes to pass that we see some, who are otherwise very honest men, so subject to this vice. I have a good fellow for my tailor, who, yet, I never knew guilty of one truth; no, not even when it had been to his advantage. If falsehood had, like truth, but one face only, we should be upon better terms; for we should then take the contrary to what the liar says for certain truth; but the reverse of truth has a hundred thousand shapes, and a field indefinite, without bound or limit. The Pythagoreans make *good* to be certain and finite; *evil* infinite and uncertain; there are a thousand ways to miss the white, there is only one to hit it. For my own part, I have this vice in so great horror, that I am not sure I could prevail with my conscience to secure myself from the most manifest and extreme danger by an impudent and solemn lie. An ancient father says that a dog we know is better company than a man whose language we do not understand. *Ut externus alieno non sit hominis vice.* And how much less sociable is false speaking than silence?—*Montaigne's Essays, by Cotton.*

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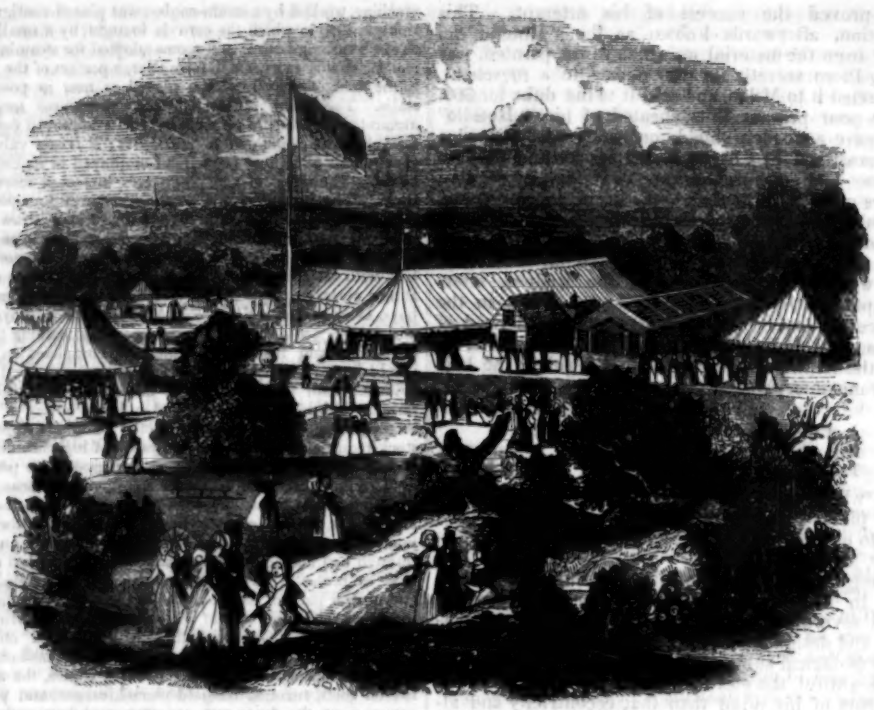
* *Rotello* means a shield or buckler; *Fico*, a fig-tree.



[Gardens of the Royal Botanical Society, Regent's Park.]

PUBLIC GARDENS OF LONDON.

The history of the public gardens in and near London, since the sixteenth century, illustrates, with tolerable completeness, the history of the changes of taste in gardening, and the general tenor of its progress. During the reign of Charles II., Greenwich and St. James's Park were laid out under the direction of the eminent French landscape designer, Le Nôtre, who had been invited to this country by Charles, with the express view of introducing the splendid French style, and many of his subjects were not slow to profit, each according to his means, by the example. Kensington Gardens were commenced by William III., who stamped upon them the impress of his own, and, we believe it may be added, the national tastes of the time. From notes made on the gardens round the metropolis, by J. Gibson, in 1691, it appears the sovereign's example was still followed with dutiful exactness; the characteristics of them all were terrace walks, hedges of evergreens, shorn shrubs in boxes, and orange and myrtle trees. Kensington Gardens as yet comprised but twenty-six acres, to which Queen Anne added thirty more, and caused them to be laid out by Wise, who turned the gravel-pits into a shrubbery, with winding walks, and was compared by Addison to an epic poet for so doing. It was about this time that there arose in different quarters a more natural taste in gardening, and which, as the commencement of our present system, has excited considerable interest and a great deal of not very conclusive discussion. One of the sources to which this taste is attributed by foreigners is odd enough—the Chinese; but our own poets seem much better entitled to whatever amount of credit may be justly assignable to any particular quarter. From Bacon downwards, we find them exercising a steady and growing influence to this end. That greatest of prose poets expressly inculcated the adding to our gardens rude or neglected spots as specimens of wild nature, and he placed gardening on a higher elevation than was dreamed of by any one else in his time. Waller, at his residence at Beaconsfield, is said to have presented more than usual evidences of natural taste. Addison is the author of the paper 'On the Causes of the Pleasures of the Imagination, arising from the works of Nature, and their Superiority over those of Art,' which appeared in 1712; and Pope, of that in which the verdant sculpture school is unmercifully attacked in the 'Guardian,' and who, in his epistle to Lord Burlington, laid down the opposite principles that were to be cultivated,—the study of nature, the genius of the place, and never to lose sight of good sense; then Thomson, by his 'Seasons,' did admirable service to the cause; and lastly, Mason published his poem on the English Garden.

The first artist who appreciated and accepted the new faith was Bridgman, who banished verdant sculpture from the royal gardens, introduced 'ha-has' instead of walls for boundaries, and portions of landscape scenery, in accordance with Bacon's ideas, but the clipped alleys were still left to be clipped. Kensington Gardens, under his superintendence, were now further enlarged, by the addition of no less than three hundred acres taken out of Hyde Park, and the Serpentine was formed from a series of detached ponds. This was considered a very bold experiment. An amusing evidence of the state of the general ideas on the subject of garden or landscape scenery is given by Mr. Loudon:—"Lord Bathurst informed Daines Barrington that he was the first who deviated from the straight line in made pieces of water, by following the natural lines of a valley, in widening the brook at Ryskins, near Colnbrook, and that Lord Strafford, thinking that it was done from poverty or economy, asked him to own fairly how little more it would have cost him to

have made it straight." But there is an older claimant to the honour of the serpentine form—Sir Christopher Wren's father, who proposed to "reduce the current of a mile's length into the compass of an orchard," and to employ the enclosed space to purposes of "gardenings, plantings, or banquetings, or aery delights, and the multiplying of infinite fish in a little compass of ground, without any sense of their being restrained." Bridgman was succeeded by Kent, who, whilst his sculpture and his paintings have sunk into merited oblivion, seems to be recognised as the first true English landscape artist, a circumstance attributed, in a great measure, and no doubt correctly, to his studies as a painter. Walpole's opinion of him is high indeed: Kent was, he says, "painter enough to taste the charms of landscape: bold and opiniative enough to dare and to dictate, and born with a genius to strike out a great system from the twilight of imperfect essays, he realised the compositions of the greatest masters in paintings." Claremont and Esher were both laid out by Kent.

The oldest Botanic gardens in England are those of Oxford and Chelsea, the last belonging to the Apothecaries' Company as early as 1674, and remaining in its possession to this day; being maintained by the Company for the use of the medical schools of London. Evelyn, who visited it in 1685, mentions as rarities he saw there a tulip-tree and a tea-shrub. Here one of the earliest attempts to supply plants that required it with artificial heat appears to have been made, the greenhouse having been heated in 1684, according to Ray, by means of embers placed in a hole in the floor. We must add to our brief notice of the Chelsea gardens, that it was here that the "Prince of Gardeners," as Linnæus called him, Philip Miller, the author of the admirable 'Gardeners' Dictionary,' spent nearly fifty years, having taken the management in 1722, and only resigned it a little before his death in 1771. The first Arboretum was that of Kew, established in 1760, through the influence of the Dowager Princess of Wales.

It is from the period of peace—1815, that we may date the commencement of the present extraordinary prosperity of English gardening; and of which the Horticultural Society, founded in 1820, must be looked upon as the chief moving impulse. 'The Royal Botanic Society of London' is of a more recent date, and was incorporated between three and four years ago, for the "promotion of Botany in all its branches, and its application to Medicine, Arts, and Manufactures, and also for the formation of extensive Botanical and Ornamental Gardens within the immediate vicinity of the Metropolis." The grounds of the Society are in the Regent's Park, and consist of eighteen acres, which were previously in the possession of a nurseryman, and then formed an almost level surface, the only noticeable deviation being the slight slope of the ground westward. In stepping into the grounds, now, the change is truly surprising, and we do not know where our readers could more readily obtain a practical example of what may be done in picturesque landscape gardening, on the most unpromising sites. As we enter, on one of the evenings devoted to the promenade, as it is called, a pretty rustic screen of ivy intercepts, for a moment, the view of the interior,—which passed, we find ourselves on a very broad gravel walk, adorned at each end with large vases on pedestals. As we pace along this walk we have, on the right, a picturesque-looking mound rising to some considerable elevation from the midst of the irregular grounds about its base, and on the left lawns and shrubberies, behind which the winding walks disappear into the lower grounds beyond, where occasional glimpses may be obtained of a brilliant parterre of flowers. At the end of the walk we ascend a flight of steps, to what is called the Terrace, where, perhaps, one of the most interesting buildings yet contrived for the protection of plants requiring, in this country, an artificial climate, is about to be erected. This is an immense winter garden, entirely covered with glass, where some three or four thousand persons may be able at once to move about the varied surface, ascending or descending the different walks,—above all, enjoying the novel effect produced by passing from the hardy plants and temperate atmosphere of their own country in the gardens without, gradually through a warmer and warmer air, each portion having its own suitable vegetation, till, at last, they reach the tropical regions of the extremity, and find themselves in the country of palms, and other such magnificent inhabitants of the East. Turning now to the right, the walk leads us to a piece of ground for the reception of plants used or useful in medicine. Another piece of ground here is devoted to the collection of the chief agricultural plants. But the most generally attractive of the whole will be the garden of hardy plants from all parts of the world, lately formed, and which already contains three thousand, and will receive at least seven thousand more.

Returning to the terrace, we pass to the lower grounds on the opposite side of the terrace, where the irregularities become more decided. Every few yards the scene changes. Now we descend into a rocky dell, spanned by an arch of rocks, and with a cave, in character with the whole, at one side; then a little rude bridge takes us across a stream winding sluggishly along between its reedy banks; then, a few yards farther, and we are in a kind of amphitheatre, devoted to the growth of the beautiful American plants, or those requiring peat soil, the rhododendrons, kalmias, azaleas, andromedas, &c. &c. Many other interesting floral compartments adorn this part of the grounds, among them a rosary, in which, however, the plants are as yet too small to be effective. Here, too, is the Secretary's office and residence, in a picturesque little building, with a richly furnished lawn in front, and a fine shady grove, with a cast of Diana and the Hart, at one side. The only other part of the gardens that we can here mention is the mount, with its winding walks of ascent, at the foot of which are numerous masses of interesting geological specimens. From the summit we obtain by far the finest view of the whole of the gardens, which from hence have really a charming effect; whilst beyond them, if we look in one direction, we have the handsome terraces of the Park, backed by impenetrable masses of houses, and in another, the ever-beautiful "sister hills" of Hampstead and Highgate.

THE ATMOSPHERIC BUDE-LIGHT.

About four years ago (No. 515), we gave a brief account of what at that time constituted the Bude-light; explaining that it was a peculiar mode of aiding the combustion of oil by a stream of oxygen gas; that it received its name from the residence of its inventor, Mr. Gurney, in Cornwall; and that it was tried in the House of Commons. Since that time changes of a remarkable character have been made in the nature of the light; so much so, indeed, that it seems doubtful whether the same name ought to be applied to it. The addition of the word "atmospheric" to the name, however, may remove this objection. Instead of oil being the combustible, and oxygen the supporter of combustion, street-gas is now the combustible, and atmospheric air the supporter.

When the original Bude-light was used in the House of Commons, in the early part of the session of 1839, it was regarded as an experiment, to be retained or

rejected as the House might afterwards think fit. The lights employed were first placed in the ceiling of the House; after which they were lowered to a distance from the ceiling, and various other arrangements were made with a view of testing the best position for them. In all these instances the lamps were supplied with oil, and the flame was excited by a stream of oxygen prepared from the oxide of manganese. A sloping ceiling of a peculiar kind having been constructed, with a view to the ventilation of the house, it was suggested that the Bude-lights should be placed above the glass of this ceiling, and shine down through it; but the loss of light through this immense field of glass was so great, that the plan was abandoned as inexpedient. To limit this loss, there were next arranged seven lights on each half of the false ceiling, so placed as to throw down light where it was most wanted. A few weeks after this modification, a vote of the House decided that the experiments should stop, and that the use of wax candles should be renewed.

A subsequent vote of the House, by which the experiments were renewed, led to the changes in the nature of the light itself. The lights in or above the false ceiling having been objected to, Mr. Gurney placed two pendants hanging from the ceiling down into the body of the house, and surrounded them by large and extensive surfaces of ground glass, so as to soften and subdue the light. But here a difficulty occurred: it was found that the use of liquid oil in such a situation, involving the occasional trimming of the lamps, would be almost impracticable; and also that the pipes conveying the oxygen to the flame would render it very difficult to raise and lower the lights. There was then an arrangement made for using oil-vapour instead of liquid oil; and this seeming to be successful, oil-gas was tried. These attempts led to the inquiry how far the common street-gas might be employed; and as there had been gas-pipes laid along the upper part of the house at a former period, Mr. Gurney purified the gas procured from this source, and substituted it for the oil.

Another point related to the substitution of atmospheric air for oxygen as a supporter of the combustion. The oxygen was made from manganese; and as great trouble, expense, and inconvenience were often experienced in procuring that mineral—as, too, the use of oxygen involved a certain complexity in the arrangement of the light, Mr. Gurney was led to adopt other means; and acting on the result of experiments made by him several years before, he came to a conclusion that the common air of a room, if brought to act on a gas flame in a particular manner, might produce a result vastly superior to that commonly produced in gas-lights. His plans were practically carried out; and so well did they succeed, that Mr. Gurney took out a patent for certain portions of the method.

Thus arose, by gradual improvements, the Atmospheric Bude-light, which is now very much used in large buildings. The improvements depend on many different points, all of which contribute to the object in view. In the first place, the common street-gas, although considerably purified at the gas-works, requires more purification before it is fit for use in this method. The gas used in the London streets is less pure than that used at Edinburgh and Glasgow, on account of the coal from which it is produced containing more sulphur; and it requires a high temperature before it will ignite. By passing this gas, however, through certain chemical ingredients, Mr. Gurney brings it to a state of purity which enables it to ignite at a much lower temperature; whereby, among other advantages, less heat is given out by the flame when kindled.

It may here be remarked, that the opposite qualities of gas as to yielding *light* and *heat* are not much attended to in London. The late Sir John Robison, secretary to the Scottish Society of Arts, pointed out very clearly how much more useful coal-gas might become if more skill were shown in its management. In a paper read before that Society, Sir John alluded to the popular opinion, that the more freely a current of air is admitted to a gas-light, the better the light will burn; and exposed the fallacy by showing "that there is only a certain proportion of air required for the favourable combustion of a definite measure of gas. If more air than this due proportion be allowed to pass up the [glass] chimney, the size of the flame will be reduced, and the quantity of light diminished; if, on the other hand, less than the due proportion be admitted, the surface of the flame will be increased by elongation, but it will become obscure, and the quantity of light will decrease, owing to the escape of particles of unconsumed carbon. A simple experiment will exemplify this:—If the flame of an ordinary Argand burner be reduced, by partially shutting the cock, to about half an inch high, the light will be pale and blue, because the supply of air is too great for the small quantity of gas which is issuing. If partial obstruction be given to the access of air, by applying a handkerchief under the burner and chimney, it will be found that the size of the flame and the quantity of light emitted will increase until it arrive at a maximum, when, by further obstruction, the admission of air will be reduced below the proportion required for the burning of the carbon, and the light will diminish."

The blue part of a gas-flame, alluded to in the above remarks, emits great heat and little light, and is therefore an evil where the gas is employed for illumination. Mr. Gurney arranges his plans so as to have little or none of this blue portion; while Sir J. Robison, having in view the production of a very convenient gas-cooking stove, arranged an apparatus for producing a highly heated but dimly illuminating flame. He wanted a substitute for French charcoal-stoves in his own house, and employed gas in the following manner:—Each gas-stove consisted of a vertical cylinder, about thirty inches in height by three or four in diameter. Over the top of this was stretched a piece of fine wire gauze, having about thirty wires to the inch. A jet of gas entered near the bottom of the cylinder, and as it ascended to the top, it became mixed with the atmosphere. It passed through the wire gauze, and was kindled as it emerged at the upper surface. Each little mesh of the wire-cloth had thus its minute stream of gas, and all united to produce a flame which emitted heat without much light.

An attention to the peculiarities of gas in respect to light and heat forms one of the features in Mr. Gurney's arrangement. The air is admitted to the gas-flame in limited quantity and in a peculiar manner. He thus described the principle of the method before the committee of the House of Commons:—"The mechanical principle by which the light is produced consists of a series of concentric rings, at definite distances from each other, and so arranged as to regulate the quantity of atmospheric air, and to communicate, by conduction and radiation, sufficient heat to raise the temperature of the gas to a given point, so as to effect the separation of its charcoal immediately as it leaves the burner; and then, by an arrangement above, to bring fresh atmospheric air at the proper points of the flame. A perfect lamp will deposit the charcoal in the flame the instant it passes the jet; an imperfect one will not. If so imperfect as to deposit too soon, charcoal will be found in the rings; if too late, then high up in the flame. There is a point of accuracy required, which practice has determined." Dr. Ure, in his evidence

before the same committee, explained that in the new arrangement the gas issues from two or more concentric series of holes, by which means the interior series, re-acting upon the exterior series of flames, produces a reciprocal augmentation of temperature, and thereby an increased light.

When the atmospheric Bude-light had been some time employed in the House of Commons, it became adopted in other large buildings; as its availability has been found more striking in large rooms than in small; that is, its advantages over the more usual forms of light are chiefly developed in large rooms where much light is required. Clapham Church is lighted by one large central burner, in lieu of the large number of gas-lights before employed. This burner has five concentric rings, each one pierced with a number of small holes; the outer ring is eleven inches in diameter; and when the jets from all the holes are kindled, there are five concentric cylinders of flame, separated by cylindrical spaces, up which the atmospheric air ascends to maintain the combustion. In Christ Church, Albany Street, seventy-two Argand gas-burners of the usual kind have been superseded by two of these new burners. St. Mary's Church, Spitalfields, is illuminated by one burner. St. Pancras Church, Regent's Square Church, Golden Square Church, and about a dozen other churches in different parts of the metropolis, are now lighted by the atmospheric Bude-light. At the Reform Club-House one of the libraries is lighted by the Bude-light, while the other exhibits an ingenious and beautiful light recently introduced by Mr. Faraday. The Senior United Service Club-House and Arthur's Club-House have the Bude-light; so also have the Stock Exchange, the Colonial Society, the London Institution, several of the London shops, and many public buildings in most of the large towns throughout the country.

The method, after being patented, was purchased by a Company, by whom it was practically carried into effect. The burner and its appendages comprise the portion of the method to which this patent relates. There are the concentric rings, a glass cone which regulates the admission of air between these rings, a glass chimney to confine the products of combustion from passing out into the room, a horizontal disk to regulate the height and whiteness of the flame, and other appendages. There is, however, another feature which deserves mention. The glass chimney of the burner yields its gaseous and deleterious contents to a pipe, which, passing up to and along or through the ceiling, carries off the whole, and serves to ventilate the room. This pipe is generally so combined with the ornamental fittings of the apparatus, that it does not offend the eye by its appearance. At the Reform Club-House the pipe, after ascending in an ornamental form to the ceiling, passes along above the ceiling, and enters the chimney belonging to the fire-place of the room. The effect of such an arrangement is, that the vitiated air of a room is drawn powerfully upward into or between the concentric rings of the burner, there parts with all or part of its oxygen in the process of combustion, and thence escapes into the open air, carrying with it the gaseous products of combustion. These ventilating tubes have not, in their nature, any especial connection with the principle of the atmospheric Bude-light more than with others; but the reason why they are in practice more applicable in this than in other cases seems to be, that lights of less power, if suspended low enough in a church or room to illuminate the objects contained in it in a fitting manner, would be at such a distance from the ceiling as to render impracticable any attempt to carry ventilating tubes from them to the ceiling; since there must be as many tubes as there are isolated burners in the room.

The Bude-light, when used on a large scale, yields more illuminating power with a given quantity of gas than the common burners. Professor Wheatstone made some experiments in the crypt of the House of Commons, from which he found that a Bude-light, consuming four times as much gas as a common gas-light, gave six and a half times as much light; so that for equal quantities of gas, the former gives more than half as much light again as the latter. The saving increases in importance as the light required is larger. For instance, if a small quantity of light were only required, the saving per cent. would be less than if a larger quantity were needed; so that in a very large room, such as the body of a church, its advantages are greatest of all. From some experiments made by Mr. Gurney (as stated in his evidence), he found that, taking the average market-prices, the expense to produce an equal intensity of light, would be—

With wax candles	=	41·0
„ composition ditto	=	33·0
„ sperm oil	=	23·0
„ common oil	=	11·3
„ common gas	=	7·2
„ atmospheric Bude	=	3·7

That is, if a given quantity of light from wax candles cost 41 pence, an equal quantity could be yielded by the atmospheric Bude for 3·7 pence, and so forth.

This light is not the only one that has recently resulted from an improved knowledge of the process of combustion; but it is one which, from the interesting steps whereby it has reached its present state, deserves a little attention as a successful example of the application of scientific principles to the useful arts.

PICTURES AND DEVICES ON WOOD.

There have from time to time been devised many different modes of producing pictorial effects on the surface of wood, independent of the usual mode of painting a picture on a panel: some of these relate to pictures in the sense generally conveyed by the term; while others relate to ornamental devices of a fanciful kind.

One of these modes is generally termed *buhl-work*, while another is known by the name of *marquetry*. They are both to a certain degree synonymous with *inlaying*. Buhl-work consists in inlaying small ornamental pieces of brass in polished wood furniture; while marquetry is the inlaying of variously coloured pieces of wood one among another. Originally the specimens of inlaying in wood consisted only of black and white pieces, and were called *morescoes*; but an extension of the art was made by staining the pieces with various colours, so as to enable the artist to represent various natural objects. The discovery of America contributed to the art, by making known the existence of woods beautifully coloured in their natural state; and these agencies taken together led to the establishment of a favourite pursuit, called "painting in wood." A piece of well-dried oak or fir was first selected: and the coloured woods, being first reduced to thin leaves or veneers, were cut out to some ornamental form by means of a very delicate saw, and glued on the panel in conformity with the pre-arranged device. Various details in relation to this kind of inlaying, and the inlaying with stones or glass, which obtains the name of *mosaic*, will be found in our No. 487.

A very remarkable mode of producing a picture, by *scrching* the surface of a piece of wood, has been sometimes combined with the method of inlaying just noticed; while in other instances pictures have been formed by this method alone. When combined with

marquetry, the scorching is used to produce shadows, the blackness resulting from the carbonization of the wood. In the other cases, however, the whole of the device is produced by scorching. The panel used for this purpose is generally of some darkish tint and of a hard texture; and the scorching is effected by means of a heated poker, or bar of iron, or piece of wire. It will easily be conceived that much artistic skill is called for in such an art, since the scorched lines on the surface of the panel must not be made to give the outlines properly so called, but rather the shadows which bound this outline. If the panel has any strongly marked lines, fibres, knots, eyes, curls, or other diversities of surface, the artist avails himself of those to produce some of his pictorial effects, scorching around or near them, or across them, according to circumstances. We have heard of an instance in which a knot in the wood was made to represent the eye of a portrait, by a few judicious touches of the scorching iron around it; while a series of curled lines or grain-marks were taken advantage of to represent the furrows in the cheek of an old man. In the hands of a clever man, this method is capable of producing very bold and striking effects. One of the celebrated pictures by Quintin Matsys has been copied by these means.

Another method of producing wood pictures, or at least ornamental devices on the surface of wood, was that for which the Society of Arts awarded to Mr. Straker a silver medal a few years ago. This singular plan rests on the tendency which woody fibres have to swell when moistened with water, and to shrink in proportion as they dry; and part of the action is also due to the facility with which soft wood will suffer compression; so that in fact these two properties are combined thus—that if a depression be made by a blunt instrument on the surface of wood, such depressed part will again rise to its original level by subsequent immersion in water. The following mode is adopted to produce the desired effects:—The panel of wood, having been first worked out to its proper shape, is sketched with a design of the pattern to be imparted to it, either in pencil or by some other means. This being done, a blunt steel tool or die is applied successively to all those parts of the pattern intended to be in relief, and is pressed or hammered cautiously, without breaking the grain of the wood, till the depth of the depression is equal to the subsequent prominence of the figures. The ground is then reduced, by planing or filing, to the level of the depressed part; after which, the piece of wood being placed in water, either hot or cold, the parts previously depressed will rise to their former height, and will thus form an embossed pattern. This very ingenious mode of producing a device in relief may be available either in the rough form thus produced, or the embossment may itself be afterwards carved, and be made to receive any delicate touches which the taste of the artist may devise.

Ornamental devices are sometimes inlaid in wood by the Egyptians, in the following manner:—Various small trinkets have occasionally reached this country made of a dark brown coloured wood, and ornamented with brilliantly shining metallic figures, formed of circles and straight lines. On examining these specimens, it has been found that the surface of the wood is cut with narrow grooves to a small depth, in a manner corresponding with the device, and that these grooves are filled up with amalgam of mercury and tin in the crystallized state, analogous to that which results from the application of mercury and tinfoil to the back of looking-glasses, miscalled 'silvering.' The amalgam seems to retain a sufficient degree of consistency to remain in the grooves, and not to fall out easily. The brilliant metallic surface is rendered clear and bright whenever the surface of the wood is wiped.

The French have practised with considerable success the art of transferring to the surface of wood devices obtained from engraved prints; in fact, it may be said that the print itself is actually transferred, minus the paper, or the greater part of it. The chief features of the process are as follows:—

A flat and carefully prepared panel of sycamore, horse-chestnut, satin-wood, maple, or other kind of wood, constitutes the ground to which the transfer is made. When the surface has been planed smooth and even, it is coated with a layer of hot glue, which, when dry, is rubbed with glass-paper or Dutch rush, to remove the small filaments which the glue had raised, and to render the surface uniform. The surface is thus made ready for the reception of a coating of spirit varnish; and when this has dried, other coatings are successively applied, to the number of five or six, each one being thoroughly dried before the next one is applied.

The edges of the print are cut close to the engraving, and the print being laid face downwards on a flat table, the back is uniformly moistened with a wet sponge; any surplus water being afterwards removed by placing the print between two sheets of blotting-paper. While the paper is still moist, another layer of varnish is applied to the wood, and the print is laid down upon it, with the engraved side in contact with the varnished surface; the whole being carefully pressed and adjusted till it lies close to the surface, free from wrinkles or air-bubbles. A sheet of dry paper is laid on the print, and a linen cloth is passed over the surface, to press it firmly down. The whole is then left untouched until the varnish and the moisture are thoroughly dried, by which time the print will have become closely and firmly united to the surface of the wood. When dry, the back of the print is moistened with a wet sponge; and the fingers are rubbed lightly backwards and forwards over it repeatedly, till the paper comes off in small rolled fragments. This is a very delicate and curious part of the process; for if the whole of the paper were thus removed, the inked impression would be so likewise; but the varnish retains the front surface of the print with such tenacity, that a very thin film of paper may be left all over the surface, if the rubbing with the finger be delicately managed. When no more of the paper can be removed without injuring the print, it is allowed to dry; and when dry there is a thin film of paper still obscuring the inked impression from view; but this film has so little substance in it, that it almost wholly disappears on the application of a coat of varnish, and the print or impression presents itself as if on the surface of the wood. When quite dry, the surface is examined; and if any small parts of the engraving have been rubbed off or defaced, they are repaired by means of fine lamp-black and gum-water. Another coating of varnish is applied, and the surface is polished with Dutch rush steeped for three or four days in olive-oil. The oil is wiped off with a soft cloth, and any remaining portion is absorbed by a little powdered starch, carefully wiped off afterwards. Three or four layers of varnish are then applied, and the surface is lastly polished with a fine woollen cloth dipped in whiting or chalk.

It will be obvious on a little consideration, that the impression is by this method transferred in a reverse position, so that all objects which appeared at the right hand in the original print must appear at the left hand as received on the surface of the wood. By a modification and some complication of the process, means have been devised by a double transfer, effected on prepared drawing-paper, to give the impression in its natural position.